

Effectiveness of Multimedia Package in Science on Scientific Aptitude of 9th Standard Students

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Abstract:

The present study was designed to measure and analyze the Scientific Aptitude of 9th standard students, to prepare multimedia package in science for 9th standard students, to study the effectiveness of Multimedia Package on scientific aptitude. Data was collected by selecting two schools of Davangere city using simple random sampling technique and 100, 9th standard students studying in these schools were selected randomly and are equated based on the achievement scores in science and are assigned equally to control and experimental group, finally to make 50 students (both boys and girls) in control group. Tools used for the collection of data are Multimedia Package in science is developed by the researcher keeping in view the abilities and level of 9th standard students and to assess the Scientific Aptitude tool developed by Nagappa. P. Shahpur was used by the researcher.

Analysis was done using independent t test and the comparison between control and experimental groups with respect to pre test and post test Scientific Aptitude scores was done by Analysis of covariance (ANCOVA) by using pre test scores as covariate and 2-way ANOVA.

And the findings were, there was a significant improvement in Scientific Aptitude after the implementation of multimedia package in science on 9th standard students of secondary schools in experimental group.

The post test Scientific Aptitude scores are significantly higher in experimental group as compared to control group. The change in Scientific Aptitude scores of 9th standard from pretest to posttest is significantly higher in experimental group as compared to control group. The post test Scientific Aptitude scores are significantly higher in experimental group as compared to control group. The male and female students in control and experimental groups have similar posttest scientific aptitude scores.

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INTRODUCTION

Scientific aptitude is the potentiality for future accomplishment in science without regard to past training and achievement. According to Bingham, aptitude is a condition or set of characteristics regarded as symptomatic of an individual's ability to acquire with training some usually specified knowledge, skill or set of responses. It includes the ability to detect fallacies and inconsistencies, to reason logically and originally, And to draw correct inductions and deductions. The above mentioned characteristics of scientific aptitude includes 8 dimensions such as experimental bent, ability to reason, detection of illogical conclusion, ability to draw conclusion from the given data, ability to interpret, scientific interest, ability to solve general problems, accuracy of observation.

Hence a very essential task of education is to identify the students abilities and develop it as it is very important in the present era of science and technology. Multimedia has the potentiality to substantially improve students learning compared to single media (Mayer and Moreno 2002). It implies the integration of multiple forms of media. This includes text, graphics, audio, video and animation. It helps the students become more effective and independent learner, and direct their own behavior while learning (Graham and Reid 1992). Hence multimedia as a instructional strategy

helps students to think in different ways and plan the solutions to problems, should be introduced. It fosters the students to take up the responsibility rather than relying upon a teacher or facilitator.

Children in a given classroom may not vary only in things they know and in their capabilities of learning, but also in which they approach and deal with the given task. Hence it is essential to give tasks in which they direct themselves to do something such as multimedia package in science which plays a significant role in developing scientific aptitude.

The multimedia as a self instructional strategy helps the children to develop the multifarious values of science and interrelated aspects that help them in a day to day life and also in different areas of national development.

NEED OF THE STUDY

Generally it is deserved that the day to day activities of the classroom aim at the development of the abilities related to knowledge and comprehension levels to large extent and application to less extent which includes higher level aspects of cognitive domain which remains more or less untouched. While it is necessary to develop these abilities and higher levels of cognitive aspects such as scientific aptitude, creativity, problem solving. Hence there is a need for the present study.

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In the context of globalization, intellectual, scientific, social excellence and other competence of an individual plays an important role and education is one of the important means to develop these qualities among children to meet the global society by being in par with the present world of science and technology. Hence there is a need for the present study.

Much of the previous investigations have focused on the scientific aptitude separately and a very few on the development of this with the help of multimedia package in science. Hence there is a need for the present study.

STATEMENT OF THE PROBLEM

A Study on Effectiveness of Multimedia Package in Science on Scientific Aptitude of 9th standard students of Davangere city.

OBJECTIVES OF THE STUDY

1. To measure and analyze the scientific aptitude.
2. To prepare multimedia instructional package in science for 9th standard students.
3. To study the effectiveness of multimedia package as a self instructional strategy In science on scientific aptitude.

SCOPE OF THE STUDY

1. The present study attempts at the preparation of multimedia instructional package and is restricted to know the effectiveness of it on scientific aptitude.
2. The study is limited to 9th standard students of Davanagere city.

VARIABLES OF THE STUDY

In the present study the researcher has selected these variables that is independent, dependent variables.

1. Independent variable :Multimedia package in science.
2. Dependent variable : Scientific Aptitude.

METHODOLOGY

For the present study, experimental method of research was used by the researcher. Two group experimental design with pre test and post test was used. Subjects were selected randomly from the population and assigned randomly to control and experimental groups. Each group was given pre test and post test. Experimental group was exposed to treatment. Pre test was administered to both the groups. Implementation of multimedia package in science on experimental group and post test was administered after the treatment.

TOOLS USED FOR COLLECTION OF DATA

1. Multimedia package: Multimedia instructional package in science was developed by the researcher keeping in view the abilities and level of 9th standard students.
2. Scientific Aptitude: Tool developed by Nagappa. P. Shahpur was used by the researcher.

Multimedia package in science includes the concepts of science for 9th standard students. It is developed by the researcher keeping in view the abilities and the level of 9th standard students. Here learner proceeds at his own speed and pace. Developing of multimedia package in science is based on three chapters in science for 9th standard students.

One each in Physics, Chemistry and Biology. In Physics researcher selected sound chapter, in Chemistry the researcher selected matter in our surrounding and in biology the researcher selected natural resources.

SAMPLING

For the purpose of the study, simple random sampling technique was used by the researcher. The sample consists of 9th standard students studying in Davangere city. Among the secondary schools of Davangere two schools were selected randomly and 100, students of 9th standard were selected randomly and equated based on the achievement scores in science and were assigned equally to control and experimental group, finally to make 50 students both boys and girls in experimental group and 50 students both boys and girls in control group.

ANALYSIS OF THE DATA

As the purpose of the study was to develop the multimedia package as a self instructional strategy in science for enhancing scientific aptitude, the experimental research design was used and the effectiveness of the developed package in science was tested. Data was collected by administering the pre test and post test and was subjected to descriptive analysis, and analysis of covariance, and 2-way ANOVA was also used for the analysis of the data.

Hypothesis 1: There is no significant difference between pre test and post test scientific aptitude scores of 9th standard students of secondary schools in control group.

To achieve above assumption or hypothesis, the dependent t-test was applied.

Table: Comparison between pre test and post test scientific aptitude scores of 9th standard students of secondary schools in control group

Test	n	Mean	SD	Mean Diff.	SD Diff.	Paired t	P-value
Pretest	50	27.80	7.00	-0.78	2.89	-1.9100	0.0620, NS
Posttest	50	28.58	7.66				

From the above table, it can be inferred that, the pre test and post test scientific aptitude scores of 9th standard students of secondary schools in control group are similar.

Hypothesis 2: There is no significant difference between pre test and post test scientific aptitude scores of 9th standard students of secondary schools in experimental group.

Table: Comparison between pre test and post test scientific aptitude scores of 9th standard students of secondary schools in experimental group

Test	n	Mean	SD	Mean Diff.	SD Diff.	Paired t	P-value
Pretest	50	29.38	7.63	-25.74	12.27	-14.8352	0.0001*, S
Posttest	50	55.12	12.16				

*p<0.05

From the above table, it can be inferred that the pre test and post test scientific aptitude scores of 9th standard students of secondary schools in experimental group are different. It means that, there is a significant improvement in scientific aptitude scores after the implementation of multimedia package in science of 9th standard students of secondary schools in experiment group.

Hypothesis 3: There is no significant difference between control and experimental groups with respect to pre test scientific aptitude scores of 9th standard students of secondary schools

To achieve above assumption or hypothesis, the independent t test has been applied.

Table: Results of independent t test between control and experiment groups with respect to pretest scientific aptitude scores of 9th standard students of secondary schools

Groups	n	Mean	SD	SE	t-value	P-value
Control group	50	27.80	7.00	0.99	-1.0790	0.2833, NS
Experiment group	50	29.38	7.63	1.08		

From the above table, it can be inferred that, a non-significant difference is observed between control and experiment groups with respect to pre test scientific aptitude scores. It means that, the pre test scientific aptitude scores of 9th standard students of secondary schools are similar in experimental group and control group.

Hypothesis 4: There is no significant difference between control and experimental groups with respect to posttest scientific aptitude scores of 9th standard students of secondary schools

Table: Results of independent t test between control and experiment groups with respect to posttest scientific aptitude scores of 9th standard students of secondary schools

Groups	n	Mean	SD	SE	t-value	P-value
Control group	50	28.58	7.66	1.08	-13.0524	0.0001, S
Experiment group	50	55.12	12.16	1.72		

From the above table, it can be inferred that, a significant difference is observed between control and experiment groups with respect to posttest scientific aptitude scores. It means that, the post test scientific aptitude scores of 9th standard students of secondary schools are different in control and experiment groups. In another words, the post test scientific aptitude scores of 9th standard students of secondary schools are significantly higher in experiment group as compared to control group.

Hypothesis 5: There is no significant difference between control and experiment groups with respect to change in scientific aptitude scores of 9th standard students of secondary schools from pretest to posttest

Table: Results of independent t test between control and experiment groups with respect to change in scientific aptitude scores of 9th standard students of secondary schools from pretest to posttest

Groups	n	Mean	SD	SE	t-value	P-value
Control group	50	0.78	2.89	0.41	-14.0030	0.0001, S
Experiment group	50	25.74	12.27	1.74		

From the results of the above table, it can be inferred that, a significant difference is observed between control and experiment groups with respect to change in scientific aptitude scores of 9th standard students. It means that, the change in scientific aptitude scores of 9th standard students of secondary schools from pre test to post test are different in control and experiment groups. In another words, the change in scientific aptitude scores of 9th standard students of secondary schools from pre test to post test are significantly higher in experiment group as compared to control group.

Hypothesis 6: There is no significant difference between control and experimental groups with respect to pre test and post test scientific aptitude scores of 9th standard students of secondary schools.

To achieve above assumption or hypothesis, the Analysis of covariance (ANCOVA) (pretest scores as covariate) technique has been applied

Table: Comparison between control and experimental groups with respect to pre test and post test scientific aptitude scores of 9th standard students of secondary schools by Analysis of covariance (ANCOVA)

Groups	n	Pretest		Posttest		
		Mean	SD	Mean	SD	Adjusted mean
Control group	50	27.80	7.00	28.58	7.66	29.15
Experiment group	50	29.38	7.63	55.12	12.16	54.55
F-test		1.1641@		209.4141#		
P-value		0.2833		0.0001*		

*p<0.05, @one way ANOVA applied, # ANCOVA applied

The results of the above table clearly show the following:

The control and experimental groups do not differ significantly with respect to pre test scientific aptitude scores of 9th standard students. It means that, the pre test scientific aptitude scores of 9th standard students of secondary schools are similar in control and experimental group.

The control and experiment groups differ significantly with respect to post test scientific aptitude scores of 9th standard students of secondary schools. It means that, the post test scientific aptitude scores of 9th standard students are different in control and experiment groups. It means that, the post test scientific aptitude scores of 9th standard students of secondary schools are significantly higher in experimental group as compared to control group

Hypothesis 7: There is no significant interaction effect of groups (control and experimental) and gender (male and female) on post test scientific aptitude scores of 9th standard students of secondary schools.

To achieve above assumption or hypothesis, the two factor analysis of variance (2-way ANOVA) test was applied.

Table: 2-way ANOVA on interaction effects of groups (control and experiment) and gender (male and female) on post test scientific aptitude scores of 9th standard students of secondary schools

Sources of variation	DF	Sum of squares	Mean sum of squares	F-value	p-value	Signi.
Main effects						
Groups	1	16673.3	16673.3	160.6295	0.0001	S
Gender	1	0.48	0.48	0.0046	0.9461	NS
2-way interaction effects						
Groups x Gender	1	164.44	164.44	1.5842	0.2112	NS
Error	96	9964.8	103.8			
Total	99	26803.01				

From the results of the above table, it can be observed that,

- The main effect of groups (control and experiment) on post test scientific aptitude is found to be statistically significant. It means that, the control and experiment groups have different post test scientific aptitude scores of 9th standard students of secondary schools.
- The main effect of gender (male and female) on post test scientific aptitude scores is found to be statistically not significant. It means that, the 9th standard male and female students have similar post test scientific aptitude scores.
- The interaction effects of groups (control and experiment) and gender (male and female) on post test scientific aptitude scores is found to be statistically not significant. It means that, male and female students in control and experimental groups have similar posttest scientific aptitude scores.

Further, Pair wise comparison of interaction effect of groups (control and experiment) and gender (male and female) on post test scientific aptitude scores of 9th standard students of secondary schools by Tukeys multiple posthoc procedures

Interactions	Control male	Control female	Experiment male	Experiment female
Mean	26.63	29.50	56.82	54.24
SD	6.66	8.02	12.09	12.30
Control male	-			
Control female	p=0.7885	-		
Experiment male	p=0.0001*	p=0.0001*	-	
Experiment female	p=0.0001*	p=0.0001*	p=0.8311	-

*p<0.05

From the results of the above table, it can be seen that,

- The male and female students in control group have similar post test scientific aptitude scores.
- The male students of secondary schools in experimental group have significant higher posttest scientific aptitude scores as compared to male students of secondary schools in control group.
- The female students of secondary schools in experimental group have significant higher post test scientific aptitude scores as compared to male students of secondary schools in control group.
- The male students of secondary schools in experimental group have significant higher post test scientific aptitude scores as compared to female students in control group.
- The female students of secondary schools in experimental group have significant higher post test scientific aptitude scores as compared to female students of secondary schools in control group.
- The male and female students of in experimental group have similar post test scientific aptitude scores.

FINDINGS

1. The pre test and post test scientific aptitude scores of 9th standard students of secondary schools in control group are similar.
2. The pre test and post test scientific aptitude scores of 9th standard students of secondary schools in experiment group are different. It means that, there is a significant improvement in scientific aptitude after the implementation of multimedia package in science on 9th standard students of secondary schools in experimental group.
3. The pre test scientific aptitude scores of 9th standard students of secondary schools are similar in control and experiment groups.
4. The post test scientific aptitude scores of 9th standard students of secondary schools are significantly higher in experimental group as compared to control group.
5. The change in scientific aptitude scores of 9th standard from pre test to post test are significantly higher in experimental group as compared to control group.
6. The post test scientific aptitude scores of 9th standard students of secondary schools are different in control and experiment groups it shows that the post test scientific aptitude scores are significantly higher in experimental group as compared to control group.
7. The male and female students in control and experimental groups have similar post test scientific aptitude scores.
 - o The male and female students in control group have similar post test scientific aptitude scores.
 - o The male students of secondary schools in experimental group have significant higher post test scientific aptitude scores as compared to male students of secondary schools in control group.
 - o The female students of secondary schools in experimental group have significant higher post test scientific aptitude scores as compared to male students of secondary schools in control group.

- o The male students of secondary schools in experimental group have significant higher post test scientific aptitude scores as compared to female students in control group.
- o The female students of secondary schools in experimental group have significant higher post test scientific aptitude scores as compared to female students of secondary schools in control group.
- o The male and female students of in experimental group have similar post test scientific aptitude scores.

CONCLUSION

From the present study we can conclude that Multimedia package in Science is effective in fostering Scientific Aptitude. It means that, there is a significant improvement in scientific aptitude after the implementation of multimedia package in science on 9th standard students of secondary schools in experimental group.

Pair wise comparison of interaction effect of groups (control and experiment) and gender (male and female) on post test scientific aptitude scores revealed that the male and female students in control group have similar posttest scientific aptitude scores.

EDUCATIONAL IMPLICATIONS

1. Learning is individualized, self-paced and hands on and learner plays a active role in learning process..
2. There is need for multimedia based science education as it increases the efforts to ensure that the younger generation have access to an appropriate scientific and technological culture.
3. Students with less imaginative skills may find it easy to understand the concepts.
4. As the development of science and technology through scientists and technologists is the important pre-requisites for the all round development of any economy in the country, higher the quality of education with higher mental abilities, higher would be the gains in all walks of life through the development of technology.
5. It may be effective strategy for developing and preparing individuals for the globalised world.
6. It helps to enlighten the educational authorities to devise the instructional strategies in the curriculum to enhance the higher order capabilities such as scientific creativity, scientific aptitude, reasoning, abstract thinking etc.
7. It helps the teacher and the taught in planning and participating in more constructive teaching learning process.
8. It helps to inculcate scientific aptitude which helps the students to become more reflective and rational in life situations.
9. It helps the teachers to play a crucial role to bring the change in the change in the out look of students as they catch them young at an impressionable age and can easily mould their vision towards right perspectives that to make science relevant to human needs and aspirations.
10. The rapid advancement of science and technology and increasing need for scientists and technologists have made it all the more important to train the higher order skills and abilities such as scientific aptitude.
11. Abstract concepts can be presented easily with Multimedia.
12. It helps the students to be trained so that they can contribute something to the society and help in the development of the nation.

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